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(11) Publication number:

**0 314 531 B1**

(2)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **02.09.92** (61) Int. Cl.<sup>5</sup>, **B05B 7/02**

(21) Application number: **88401701.3**

(22) Date of filing: **01.07.88**

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(54) **Spray gun paint cup and lid assembly.**

(51) Priority: **30.10.87 US 115126**

(52) Date of publication of application:  
**03.05.89 Bulletin 89/18**

(53) Publication of the grant of the patent:  
**02.09.92 Bulletin 92/36**

(56) Designated Contracting States:  
**BE DE FR GB IT**

(57) References cited:  
CH-A- 335 251  
DE-A- 2 144 459  
DE-A- 3 022 913  
US-A- 2 670 239  
US-A- 2 904 262

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**EP 0 314 531 B1**

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## Description

The invention relates to paint spray guns of the hand held type and more particularly to a paint cup and lid assembly for a hand held spray gun of the type connected to a source of compressed air. The paint cup is selectively operated for suction paint feed or for pressurized paint feed.

A commonly used type of hand held paint spray gun has a paint cup attached to extend below a barrel portion of the gun. Compressed air is supplied to the gun through a hose attached to the butt of a handle. The compressed air is supplied under the control of a trigger actuated valve to a nozzle for atomizing paint and often for shaping the pattern of the atomized paint. In one type of spray gun, when a trigger actuated fluid valve is opened, the flow of compressed air aspirates or sucks paint from a paint cup into the nozzle where the compressed air carries the paint through an orifice and atomizes the paint. For this type of spray gun to function, the paint cup must be vented to atmosphere. Otherwise, as paint is consumed, a vacuum will build up in the paint cup and paint feed will cease. In another type of spray gun, a portion of the compressed air is supplied to the interior of the paint cup for pressurizing the paint cup. The pressure causes the paint to flow from the cup to the nozzle, where it is discharged with air through an orifice and atomized when a trigger actuated fluid valve is opened. Pressure assisted paint feed is used with paints which are too viscous for suction feed or for applications where fast coverage is more important than the quality of the finish.

In the past, most spray guns of the suction feed type were not designed to operate satisfactorily in a pressurized feed mode since they were not constructed to supply compressed air to the paint cup. If a separate compressed air line is connected from the compressed air source to the paint cup, paint can flow into the atomization air and pattern shaping air passages if the paint pressure exceeds the air pressure in the spray gun.

Typical prior art documents would be US 2,670,239, DE 2,144,459, and US 2,904,262, the independent claim 1 of the instant patent being based on this later of prior art document. The US 2,904,262, patent shows an adjustable suction and pressure feed which requires a supplemental valve to close the communication between the bore and the valve chamber. This patent does not, however, show a shroud which may be indexed between either a first or a second position relative to the spray gun whereby compressed air is led to the interior of the paint cup to pressurize the paint cup when the shroud is in a first position and, when the shroud is in a second position, blocking the supply

of air from the gun to the paint cup and simultaneously venting the interior of the paint cup to atmospheric pressure, as will be discussed in more detail hereinafter.

- 5 A conventional hand held spray gun of the type connected to a compressed air source and designed for suction paint feed from a paint cup is modified according to the invention to include a threaded nipple from which the paint feed tube extends. An atomization air passage downstream from a trigger actuated air valve is provided with an outlet adjacent the nipple. An upper end of a shroud is attached to the nipple by means of a threaded retainer sleeve and a lower end of the shroud is attached to a paint cup. The shroud and the spray gun cooperate to permit orientation of the shroud in first and second positions relative to the spray gun. In the first shroud position, a passage in the upper shroud end aligns with the compressed air opening in the spray gun and the paint cup is closed to atmosphere to provide for pressurized paint feed. Since the paint cup is pressurized with atomization air from the spray gun, the paint pressure will never be higher than the air pressure and paint will not flow into the air passages in the spray gun. In the second shroud position, the compressed air opening on the spray gun is blocked and the shroud passage connects to a vent passage or notch in the spray gun which vents the paint cup to atmosphere for suction paint feed.

Accordingly, it is an object of the invention to provide an improved spray gun paint cup and lid assembly.

- Another object of the invention is to provide a paint cup and lid assembly for a spray gun capable of operating either in a pressurized feed mode or in a suction feed mode.

These objects are achieved in that there is provided in the paint spray gun according to the invention a means co-operating between the spray gun and a shroud for indexing the shroud in either a first or a second position relative to this spray gun whereby a means for supplying compressed air from the spray gun to the interior of the paint cup to pressurize paint cup is activated when the shroud is in a first position and wherein there is included means for blocking the supply of compressed air from the spray gun to the paint cup and for simultaneously venting the interior of the paint cup to administer pressure when the shroud is in the second position.

Other advantages of the invention will be apparent from the following detailed description and the accompanying drawings.

## Brief Description Of The Drawings

Fig. 1 is a vertical cross sectional view through a

spray gun and paint cup and lid assembly according to the invention and showing the paint cup in a pressurized feed mode;

Fig. 2 is a fragmentary view showing the threaded nipple, the compressed air outlet, the vent notch and the shroud indexing arrangement on the button of the spray gun;

Fig. 3 is an enlarged fragmentary cross sectional view showing the attachment between the shroud and the spray gun when the paint cup is vented and operated in a suction feed mode;

Fig. 4 is a perspective view of the retainer sleeve; and

Fig. 5 is a perspective view of the shroud.

Turning to Fig. 1 of the drawings, a cross sectional view is shown through an assembly 10 including a spray gun 11, a lid assembly 12 and a paint cup 13. Except for modifications for attachment and operation of the lid assembly 12, the spray gun 11 may be a conventionally designed hand held air atomization type spray gun. The spray gun 11 includes a handle 14 terminating at a butt 15 in a fitting 16 for attachment to a compressed air hose (not shown). The handle 14 is integrally attached to a housing 17 in which an air valve 18 is mounted. A trigger 19 is pivotally mounted on the housing 17 for operating the air valve 18 and for moving a valve needle 20. The front of the housing 17 defines a barrel 21 on which a conventional fluid tip 22 and air cap 23 are mounted.

The air fitting 16 on the handle 14 connects to a passage 24 which extends through the handle 14 to the valve 18. When the trigger 19 is squeezed to open the air valve 18, air flows from the passage 24 through a passage 25 to a passage 26 in the housing 17. The passage 26 delivers air to a chamber 27 between the fluid tip 22 and the air cap 23. When the valve needle 20 is moved by the trigger 19, an orifice 28 in the air cap 23 is opened and compressed air from the chamber 27 is discharged. The valve needle 20 passes through the fluid tip 22 to the orifice 28. The fluid tip 22 has an interior chamber 29 surrounding the valve needle 20 which opens at a front 30 concentric with the orifice 28. When air flows through the orifice 28, fluid is sucked or aspirated from the chamber 29. The chamber 29 is connected through a passage 31 and a paint feed tube 32 to the bottom of the paint cup 13. Accordingly, the flow of air through the orifice 28 produces a suction feed of paint from the cup 13 through the tube 32, the passage 31, the chamber 29 and the orifice 28. As the paint is discharged with the flow of compressed air from the orifice 28, the paint is atomized.

The spray gun 11 also has a valve assembly 33 located in the housing 17. The valve assembly 33 includes an adjustment knob 34 and a valve needle 35. The adjustment knob 34 is manually

turned to move the needle 35 toward and away from a seat 36 to control the flow of compressed air from the passage 26 into a chamber 37 in the air cap 23. The chamber 37 communicates with orifices 38 which direct air against the atomized paint to impart a flat or fan shape to the envelope of the atomized paint. When the valve needle 35 is against the seat 36, no air will flow through the orifices 38 and the atomized paint will have a round envelope.

A portion 39 is formed integral with the housing 11 to depend from the barrel 21. A threaded nipple 40 extends below the bracket 39. The lid assembly 12 is attached to the nipple 40 and the paint cup 13 is attached to the lid assembly 12. The paint passage 31 extends through the bracket 39 and the nipple 40 and the paint feed tube 32 is held in an end of the passage 31 to extend below the nipple 40. Above the nipple 40, the bracket 39 has a downwardly facing surface 41, as best seen in Figs. 1 and 2. A passage 42 communicates from the surface 41 to the atomization air chamber 27. A vent notch 43 also extends from the surface 41 to a rear surface 44 on the bracket 39. Relative to the nipple 40, the vent notch 43 is located diametrically opposite the compressed air passage 42. Two locating notches 45 are formed in the surface 41 at uniform radial spacing from and on opposite sides of the nipple 40. The notches 45 are equally spaced from the passage 42 and the vent notch 43.

The lid assembly 12 includes a shroud 46, a retainer sleeve 47 and a disc or diaphragm 48. As best seen in Figs. 1, 3 and 5, the shroud 46 is generally tubular shape and has an upper end 49 defining an opening 50 which is sized to receive the nipple. Two tabs 51 extend from the end 49 on diametrically opposite sides of the opening 50. The tabs 51 are shaped and located to be received by the notches 45 in the spray gun bracket surface 41. The tabs 51 and the notches 45 cooperate to permit attachment of the shroud 46 to the spray gun bracket in either of two positions rotated 180 degrees apart. A passage 52 extends through the shroud end 49. The passage 52 is located to align with the compressed air passage 42 in the bracket 39 when the shroud 46 is oriented in a first position, as shown in Fig. 1, and to align with the vent notch 43 when the shroud 46 is oriented in a second position relative to the bracket 39, as shown in fragmentary in Fig. 3.

As best seen in Figs. 1 and 4, the retainer sleeve 47 is generally tubular in shape and has a central opening 53. The retainer sleeve opening 53 has an internally threaded upper end 54 which engages the threaded nipple 40. The retainer sleeve opening 53 also has a reduced diameter portion 55 which receives and supports the paint feed tube 32. A plastic compression seal 56 is

positioned on the tube 32 above the retainer sleeve portion 55. When the retainer sleeve 47 is threaded onto the nipple 40, the seal 56 is compressed between the nipple 40 and the retainer sleeve portion 55 to form a fluid seal and to hold the tube 32 in the end of the passage 31. The retainer sleeve 47 has an enlarged lower end 57, which preferably is slightly flattened or oval shaped in cross section to facilitate grasping when attaching the retainer sleeve 47 to or removing it from the nipple 40. The disc or diaphragm 48 is positioned on the retainer sleeve 47 and closely engages a shaft portion 59 of the sleeve 47 above the lower sleeve end 57.

In assembling the lid assembly 12 onto the spray gun 11, a user first determines if the assembly 10 will be used in a suction feed mode or in a pressure feed mode. For most materials such as relatively low viscosity paints and lacquers, the assembly 10 will be operated in a suction feed mode. A gasket 58 is positioned on the upper shroud end 49 with a gasket opening 60 aligned with the shroud opening 50 and the shroud 46 is positioned on the nipple 40 in the orientation shown in Fig. 3 with the shroud passage 50 aligned with the vent notch 43. The diaphragm 48 is positioned on the retainer sleeve 47, the paint feed tube 32 is inserted into the sleeve portion 55 and the seal 56 is positioned on the tube 32. The retainer sleeve 47 then is threaded onto the nipple 40 to firmly attach the shroud 47 to the spray gun 11 and to hold the paint feed tube 32 in the passage 31. When the retainer sleeve 47 is threaded onto the nipple 40, the disc or diaphragm 48 is slightly deflected downwardly at its perimeter by a downwardly facing lip 61 on the shroud 46. The diaphragm 48 closes the bottom of a chamber 62 between the shroud 46 and the retainer sleeve 47. At its top, the chamber 62 communicates through the passage 50 with the vent notch 43. At its bottom, the chamber 62 communicates through a notch 63 in the diaphragm 48 with an interior 64 of the paint cup 13 which is threaded onto a lower end 65 of the shroud 47. Thus, the interior of the paint cup 13 is vented to atmosphere through the diaphragm notch 63, the chamber 62, the passage 41 and the vent notch 43. The diaphragm 48 preferably is oriented with the notch 63 located towards the rear of the spray gun 11 and functions to prevent dripping from the vent notch 43 when the spray gun 11 is tipped during use.

For more viscous paint, it may be necessary to operate the assembly 10 in a pressure feed mode to obtain proper paint flow to the spray gun 11. Pressure feed is obtained by merely loosening or removing the retainer sleeve 47 on the nipple 40, moving the shroud 46 to withdraw the tabs 51 from the notches 45, rotating the shroud 180 degrees

and finally retightening the retainer sleeve 47 on the nipple 40. As shown in Fig. 1, the shroud passage 50 will now align with the spray gun passage 42 and the shroud end 49 and the gasket 58 will block the vent notch 43. Consequently, the interior of the paint cup 13 is now closed from the atmosphere and is pressurized with compressed air from the chamber 27 whenever the spray gun trigger 19 is squeezed.

It will be appreciated that various changes and modifications may be made to the above described embodiment of the invention without departing from the spirit and the scope of the following claims. In particular, the invention is readily adaptable to many different conventional spray gun designs other than the specifically shown and described spray gun 11.

### Claims

1. A paint spray gun (11) and paint cup (13) assembly for operation from a source of compressed air, said spray gun (11) having a threaded nipple (40) and a suction paint feed tube (32) extending from said nipple (40) and connected to supply paint to a nozzle, said paint cup (13) defining an open top and having a threaded end surrounding said open top, lid means (12) attaching said paint cup (13) to said spray gun (11) with said paint feed tube (32) extending into said paint cup (13) including a shroud (46) having a first end (49) adapted to fit over said nipple (40) and to abut the spray gun (11), said shroud (46) having a second end (65) threaded to engage said threaded paint cup end, a retainer (47) having an internally threaded first end (54) engaging said threaded nipple (40) to retain said shroud (46) on said spray gun (11), means (42,60,52,62,63) for supplying compressed air from said spray gun (11) to the interior of said paint cup (13) to pressurize said paint cup (13) characterized by means (51,45) cooperating between said spray gun (11) and said shroud (46) for indexing said shroud (46) in either a first position or a second position relative to said spray gun (11), with the means (42,60,52,62,63) for supplying being responsive when said shroud (46) is in the said first position, and means (56,60,43) for blocking the supply of compressed air from said gun (11) to said paint cup (13) and for simultaneously venting the interior of said paint cup (13) to atmosphere when said shroud (46) is in said second position.
2. A paint spray gun (11) and paint cup (13) assembly for operation from a source of com-

pressed air, as set forth in claim 1, wherein said spray gun (11) has a compressed air passage (42) having an opening adjacent said nipple (40), and wherein said means (42,60,52,62,63) for supplying compressed air from said spray gun (11) to said paint cup (13) interior is characterized by a passage (60,52) through said first shroud end (49) located to align with said compressed air passage (42) opening in said spray gun (11) when said shroud (46) is in said first position.

3. A paint spray gun (11) and paint cup (13) assembly for operation from a source of compressed air, as set forth in claim 2, wherein said means (58,60,43) for selectively blocking the supply of compressed air to said paint cup (13) and for venting said paint cup (13) interior to atmosphere is characterized by means (58,41) for blocking said compressed air passage opening (42) in said spray gun (11) when said shroud (46) is in said second position and a passage (43) in said spray gun (11) connecting said passage (42) through said first shroud end (49) to atmosphere when said shroud (46) is in said second position.
4. A paint spray gun (11) and paint cup (13) assembly for operation from a source of compressed air, as set forth in claim 3, and further characterized by a diaphragm (48) extending between said shroud (46) adjacent said second shroud end (65) and said retainer (47) adjacent a second retainer end (57), said diaphragm (48) forming a chamber (62) within said shroud (46), said passage (52) in said first shroud end (49) opening into said chamber (62), and a passage (63) in said diaphragm (48) connecting said chamber (62) to said paint cup (13) interior.

#### Patentansprüche

1. Anordnung aus einer Farbspritzpistole (11) und einem Farbbehälter (13) zur Betätigung in Verbindung mit einer Druckluftquelle, wobei die Spritzpistole (11) einen Gewindestutzen (40) und ein Farbzuführ-Saugrohr (32) aufweist, das von dem Stutzen (40) ausgeht und angeschlossen ist, um Farbe einer Düse zuzuführen, wobei der Farbbehälter (13) ein offenes oberes Ende hat mit einem Gewinde, welches das offene Ende umgibt, ferner mit einem Deckel (12), der den Farbbehälter (13) mit der Spritzpistole (11) verbindet, wobei das Farbzuführrohr (32) sich in den Farbbehälter (13) erstreckt und der Deckel einen Mantel (46) mit einem ersten Ende (49) hat, das den Stutzen

- (40) umgreift und an der Spritzpistole (11) anliegt, wobei der Mantel (46) ein zweites Ende (65) hat, das auf das Gewindeende des Farbbehälters geschraubt ist, ferner mit einer Büchse (47), die ein inneres mit Gewinde versehenes erstes Ende (54) hat, das in Eingriff mit den Gewindestutzen (40) steht, um den Mantel (46) an der Spritzpistole (11) zu halten sowie mit Mitteln (42, 60, 52, 62, 63) um Druckluft von der Spritzpistole (11) ins Innere des Farbbehälters (13) zu führen, um den Farbbehälter (13) unter Druck zu setzen, dadurch **gekennzeichnet**, daß Einrichtungen (51, 45) vorgesehen sind, die zwischen der Spritzpistole (11) und dem Mantel (46) zusammenwirken, um den Mantel (46) entweder in einer ersten Position oder in einer zweiten Position relativ zur Spritzpistole (11) einzustellen, daß ferner die Zufuhr-Einrichtungen (42, 60, 52, 62, 63) ansprechen, wenn der Mantel (46) in seiner ersten Position ist, und daß Einrichtungen (58, 60, 43) vorgesehen sind, um die Zufuhr der Druckluft von der Spritzpistole (11) zum Farbbehälter (13) zu sperren und um gleichzeitig den Innenraum des Farbbehälters (13) zur Atmosphäre zu entlüften, wenn der Mantel (46) sich in seiner zweiten Position befindet.
2. Anordnung nach Anspruch 1, dadurch **gekennzeichnet**, daß die Spritzpistole (11) einen Druckluftkanal (42) aufweist mit einer Öffnung angrenzend an den Stutzen (40), daß ferner die Einrichtungen (42, 60, 52, 62, 63) für die Zufuhr von Druckluft von der Spritzpistole (11) ins Innere des Farbbehälters (13) einen Kanal (60, 52) durch das erste Mantel-Ende (49) aufweisen, welcher mit der Öffnung des Druckluftkanals (42) in der Spritzpistole (11) fließt, wenn der Mantel (46) sich in seiner ersten Position befindet.
3. Anordnung nach Anspruch 2, dadurch **gekennzeichnet**, daß die Einrichtungen (58, 60, 43) zum wahlweisen Sperren der Zufuhr an Druckluft zum Farbbehälter (13) und zum Entlüften des Innenraumes des Farbbehälters (13) zur Atmosphäre Einrichtungen (58, 41) aufweisen, um die Druckluftkanalöffnung (42) in der Spritzpistole (11) zu sperren, wenn der Mantel (46) sich in seiner zweiten Position befindet, und daß ein Kanal (43) in der Spritzpistole (11) den Kanal (42) durch das erste Mantel-Ende (49) mit der Atmosphäre verbindet, wenn der Mantel (46) sich in seiner zweiten Position befindet.
4. Anordnung nach Anspruch 3, **gekennzeichnet** durch eine Membran (48), die sich zwischen

dem Mantel (46) angrenzend an das zweite Mantel-Ende (65) und der Büchse (47) angrenzend an ein zweites Büchsen-Ende (57) erstreckt, daß ferner die Membran (48) eine Kammer (62) innerhalb des Mantels (46) bildet, daß der Kanal (52) im ersten Mantel-Ende (49) sich in die Kammer (62) öffnet, und daß ein Kanal (63) in der Membran (48) die Kammer (62) mit dem Innenraum des Farbbehälters (13) verbindet.

#### Revendications

- Ensemble formé par un pistolet de projection de peinture (11) et un récipient de peinture (13) pour fonctionnement à partir d'une source d'air comprimé, ledit pistolet de projection (11) comportant un raccord fileté (40) et un tube (32) d'alimentation en peinture par aspiration qui s'étend à partie de ce raccord (40) et est branché de manière à fournir de la peinture à une buse, ledit récipient de peinture (13) définissant une partie supérieure ouverte et ayant une extrémité filetée qui entoure ladite partie supérieure ouverte, un moyen de couvercle (12) fixant ledit récipient de peinture (13) au pistolet de projection (11) avec le tube (32) d'alimentation en peinture s'étendant jusque dans le récipient de peinture (13) comportant une enveloppe de recouvrement (46) ayant une première extrémité (49) destinée à se monter sur ledit raccord (40) et à buter contre le pistolet de projection (11), ladite enveloppe de recouvrement (46) ayant une seconde extrémité (65) filetée de manière à venir s'engager sur l'extrémité filetée du récipient de peinture, un organe de retenue (47) ayant une première extrémité (54) au filage interne s'engageant dans ledit raccord fileté (40) pour maintenir l'enveloppe de recouvrement (46) sur le pistolet de projection (11), des moyens (42, 60, 52, 62, 63) pour fournir de l'air comprimé à partir du pistolet de projection (11) à l'intérieur du récipient de peinture (13) afin de pressuriser ce récipient (13).

caractérisé par des moyens (51, 45) co-péenant entre le pistolet de projection (11) et l'enveloppe de recouvrement (46) pour placer cette enveloppe (46) soit dans une première position soit dans une seconde position par rapport au pistolet de projection (11), avec les moyens (42, 60, 52, 62, 63) de fourniture répondant lorsque ladite enveloppe de recouvrement (46) se trouve dans la première position, et des moyens (58, 60, 43) pour bloquer la fourniture d'air comprimé par le pistolet (11) au récipient de peinture (13) et pour ventiler simultanément l'intérieur du récipient de peinture (13) vers l'atmosphère lorsque l'enveloppe de recouvrement (46) se trouve dans la seconde position.

- Ensemble formé par un pistolet de projection de peinture (11) et un récipient de peinture (13) pour fonctionnement à partir d'une source d'air comprimé, selon la revendication 1, dans lequel ledit pistolet de projection (11) comporte un passage (42) pour air comprimé ayant une ouverture contiguë audit raccord (40), et dans lequel ledits moyens (42, 60, 52, 62, 63) pour la fourniture de l'air comprimé à partir du pistolet de projection (11) à l'intérieur dudit récipient de peinture (13) sont caractérisé par un passage (60, 52) traversant la première extrémité (49) de l'enveloppe de recouvrement située de façon à être en alignement avec l'ouverture du passage (42) d'air comprimé ménagée dans ledit pistolet de projection (11) lorsque l'enveloppe de recouvrement (46) se trouve dans la première position.
- Ensemble formé par un pistolet de projection de peinture et un récipient de peinture (13) pour fonctionnement à partir d'une source d'air comprimé, selon la revendication 2, dans lequel ledits moyens (58, 60, 43) pour bloquer sélectivement la fourniture d'air comprimé au récipient de peinture (13) et pour ventiler l'intérieur du récipient de peinture (13) vers l'atmosphère sont caractérisés par des moyens (58, 41) pour bloquer l'ouverture (42) du passage de l'air comprimé ménagée dans le pistolet de projection (11) lorsque l'enveloppe de recouvrement (46) se trouve dans la seconde position et un passage (43) pratiqué dans le pistolet de projection (11) connectant ledit passage (42) traversant la première extrémité (49) de l'enveloppe de recouvrement à l'atmosphère lorsque l'enveloppe de recouvrement (46) se trouve dans la seconde position.
- Ensemble formé par un pistolet de projection de peinture (11) et un récipient de peinture (13) pour fonctionnement à partir d'une source d'air comprimé, selon la revendication 3, et caractérisé en outre par un diaphragme (48) s'étendant entre ladite enveloppe de recouvrement (46) contiguë à la seconde extrémité (65) de l'enveloppe de recouvrement et l'organe de retenue (47) contigu à une seconde extrémité (57) de l'enveloppe de recouvrement, ledit diaphragme (48) formant une chambre (62) à l'intérieur de l'enveloppe de recouvrement (46), ledit passage (52) ménagé dans la première extrémité (49) de l'enveloppe de recouvrement débouchant dans la chambre (62), et

un passage (63) pratiqué dans le diaphragme (48) reliant ladite chambre (62) à l'intérieur du récipient de peinture (13).

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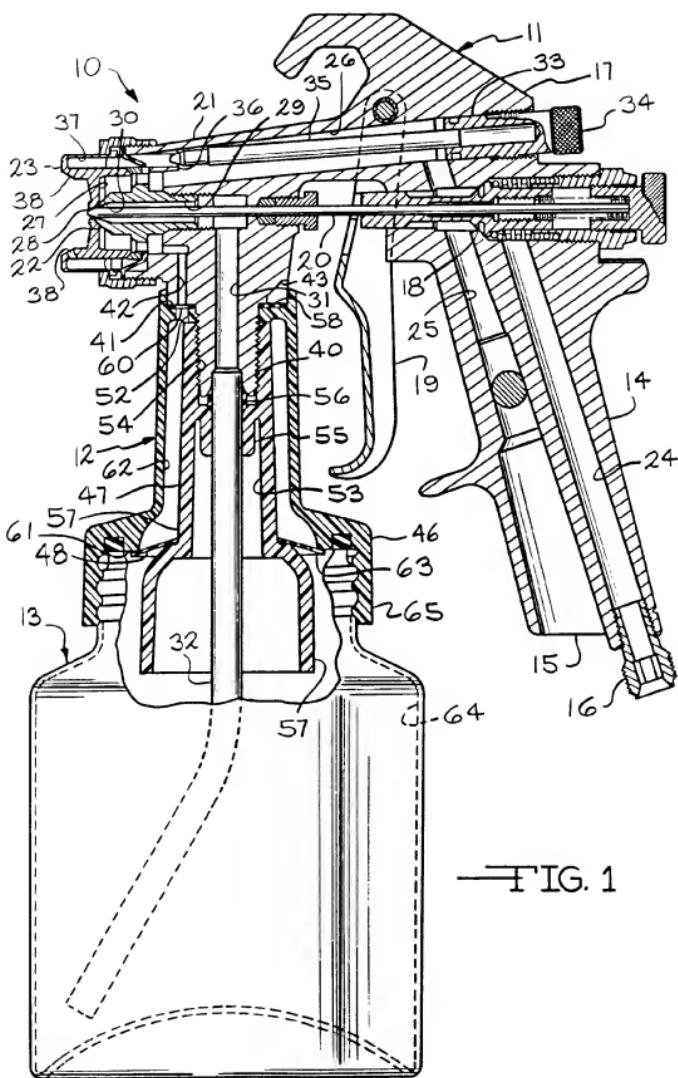
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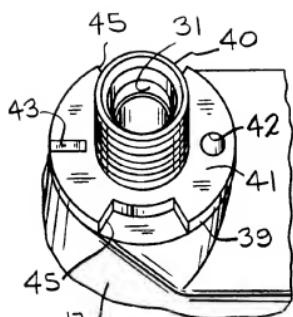
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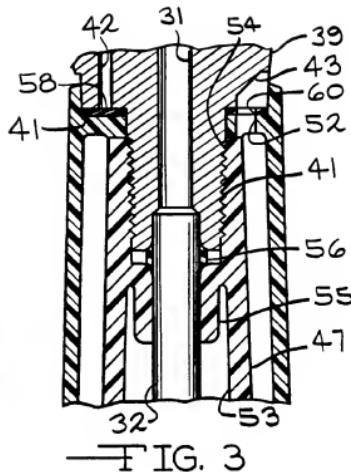
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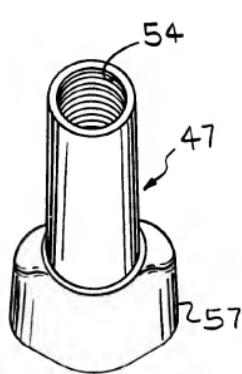
—FIG. 1



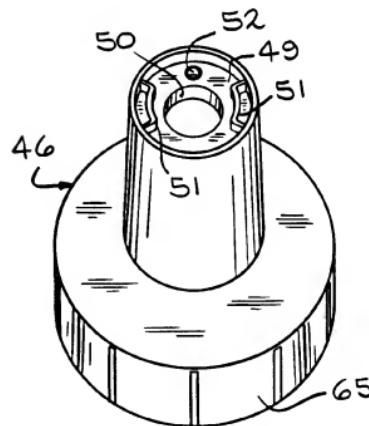
— FIG. 2



— FIG. 3



— FIG. 4



— FIG. 5